DEC 9 1924

AMERICAN
GAS JOURNAL
Established 1859 Pioneer of the Gas Industry

VOL. 121. No. 22.
WHOLE NO. 3403

NEW YORK, SATURDAY, NOVEMBER 29, 1924

Subscription, $3 Per Year
$4 Canada $5 Foreign

IMPERIAL GAS IRONS
Sell Easily!

Two and one-half millions of Imperial Gas Irons are bringing comfort and satisfaction to the housewives of America, and a generous profit to the dealers who sell them. Our sales average 2,500 per week. The reason will be found in The Seven Exclusive Features.

Our demonstration staff will teach the appliance department the easiest way to sell Imperials, and open the way for disposing of other gas appliances. There's an exceedingly generous profit awaiting the gas companies who use our extraordinary merchandising plans. Write, 'phone or wire for an interview.

GENERAL SPECIALTY COMPANY
455 ELEVENTH AVENUE, NEW YORK CITY

Advertising Index, Page 25

ROOTS

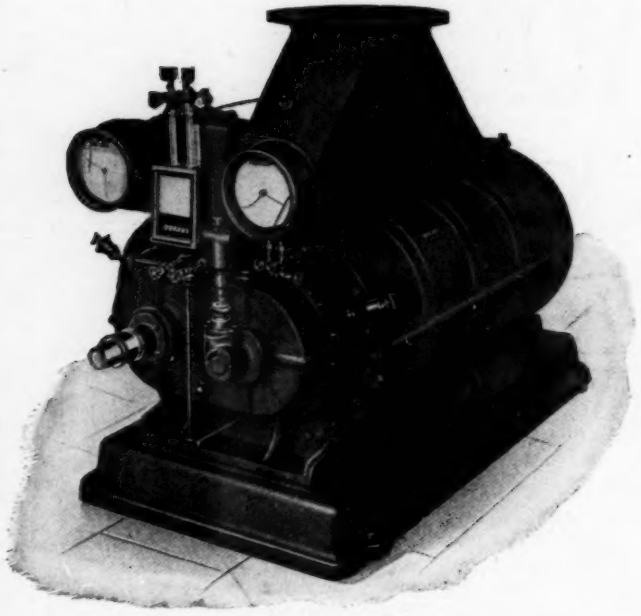
A Combination of Advantages

ROOTS Positive Displacement Gas Meter combines the good points of many other meters into one, giving you the most serviceable meter on the market.

The cost of a Roots Meter is only a fraction of that asked for other meters of corresponding accuracy.

ROOTS Meters are simply constructed and easily operated. You are not restricted to capacity limits, while care in regard to water levels and corrosion is eliminated. The instrument combinations furnished with ROOTS Meters enable you to reduce the readings to a standard base or give instantaneous reading of the volume being passed. Such instruments furnish valuable information regarding the performance of the set, which makes for more intelligent operation.

Bulletin 111 will tell you more about this perfected station meter. Write for it.



ROOTS Gas Exhausters and Boosters have been the standard for Gas Works for a generation. Ask us about the new ROOTS Stuffing Box design.

ROOTS Rotary Blowers for Water Gas Sets require only half the steam and much less maintenance.

ROOTS Rotary Pumps are best for Wash Oils, Tar, Gas Oil, etc.

We have patents allowed and held in the Patent Office pending additional improvements and patents pending covering our recording instruments used in connection with our meter.

The P. H. & F. M. ROOTS CO.

CHICAGO
Peoples Gas Building

CONNERSVILLE, INDIANA

CLEVELAND
1576 Union Trust Bldg.

NEW YORK
120 Liberty Street

AMERICAN
GAS JOURNAL

Vol. 121. No. 26 NEW YORK, NOVEMBER 29, 1924 Whole No. 3496

Experiences With Customer Ownership

Some of the features of successful selling of utility securities

William H. Hodge

IT APPEARS that 187 gas companies and an unstated number of combination gas and electric companies sold a total of 1,251,640 shares of stock to 227,170 investors during the first eight months of 1923. For the year 1922 the customer ownership committee of the National Electric Light Association presented data received from 156 electric companies, showing the sale of 1,750,707 shares of stock to 198,018 investors during that year.

During the full year of 1923 about 300,000 citizens were added to the already large list of the owners of our electric, gas and telephone industries, and from $250,000,000 to $300,000,000 of new capital for construction purposes was raised in this manner.

It is believed that the stockholders of the electric, gas, telephone and traction companies now aggregate about 2,000,000. This is probably 1,500,000 more than existed five years ago. Customer ownership has caused a large part of the difference.

Agitators Don't Like It

It is growing in volume year by year. In the struggle with the advocates of political ownership it will prove our best defense.

Among ourselves a great deal has been said in favor of the customer ownership idea and little, if anything, against it. The political ownership people, however, dislike it. They call it a form of propaganda. They do not wish to recognize its economic soundness and its political fairness; customer ownership cuts too deeply into their fantastic and impracticable designs for any such candor.

We seem to be pretty well agreed as to the merits and desirability of customer ownership, but there are still many organizations which have not become active in this form of good-will building and financing. The executives of such companies doubtless will be interested in a recital of plain, matter-of-fact experience.

The Byllesby organization began to experiment with customer ownership in 1915, after observing the initial efforts of the Pacific Gas & Electric Company. Since then our companies have sold about $43,000,000 par value of preferred stock to 81,000 purchasers. Sales increase steadily year after year. During the past eight years about 40 per cent of the aggregate capital raised for construction purposes at these properties has been derived from customer ownership sales.

Not an Easy Task

The development of customer ownership selling is not easy. It is a difficult task, requiring concentration, persistency and whole-hearted enthusiasm. If you are going to obtain the benefits of customer ownership you must win them by intelligent, consistent endeavor and 100 per cent support by the management. From the president of the company down the line there must be encouragement, sympathy, understanding and daily effort. The idea must become an organization policy—more than that, an organization ideal, which has for its objective the true welfare of the public through the welfare of the company.

Employer-Customer Ownership

The term "customer ownership" really should be "employee-customer ownership," because the place to start is with the executives and workers on your own payroll. Before the public is approached the employees should be fully informed and given the first opportunity to become partners in the enterprise which they help to maintain. At meetings, luncheons and dinners the employees should be made

to feel that the management wants them to know all about the business, to be part owners of it, and to be able to interpret the company properly to the people they meet.

The get-together and educational work ought to be done with respect to employees, irrespective of just what part they are expected to take in the actual selling of securities. In any even, you want them to be able to make satisfactory replies when people ask them what the company is trying to do, and what are the recommendations of the stock being offered to customers. An employee force cannot possibly co-operate unless the management tells them what it is driving at.

Our own experience has been that we cannot expect the employee-body to sell an adequate amount of stock month after month and year after year. Only one in ten employees can sell at all. When their circle of relatives and a few friends is exhausted nothing more can be expected of them, except the bringing in of an occasional prospect and general boosting.

Small Group of Salesmen

We believe in placing reliance upon a small, carefully selected securities sales organization which remains steadily on the job and gets its bread and butter therefrom.

Unless you center your customer ownership activities upon one executive in your organization, and that executive is the right man for the job, no great success over any considerable period may be expected. Some capable man must have this job very much at heart and give it long hours of devoted thought and effort. The more he knows about the business and the more thoroughly grounded he is in the principles of good public relations, the better securities sales manager he will be. A high pressure promotion man is helpless. The bond man who sells on technical points can make no headway. The man who earned his first dollar as a central station roustabout and years later learned that he could sell house wiring and flatirons—who has seen the business grow and who has grown with it—this individual finds himself in a congenial sphere and accomplishes wonderful things.

Salesmen of Special Type

The salesmen under the securities manager also must be of a special type. They, too, must believe thoroughly in the industry and the company—the solid, reliable, industrious kind of a man, who unconsciously impresses other people with his integrity, truthfulness and general characteristics of a good citizen. He must see many people, cover many miles, and work long hours if he is to succeed. His big sales will be few and far between, but he will earn from $6,000 to $10,000 a year, and even more, if he does his work well, and when he thinks back over the expenditure of his time he will be able to sleep soundly at night.

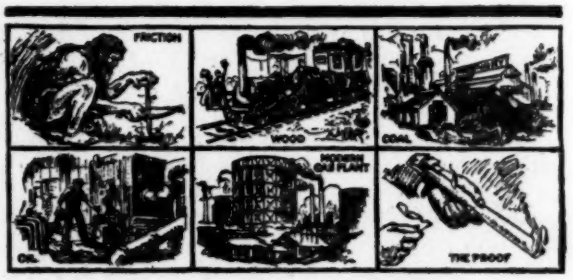
Most of the men in the customer ownership departments have been developed—quite a few from other departments.

We have found that it pays well to hold salesmen's meetings from time to time at which the higher executives outline the company's plans, achievements and ambitions. The best sales organization needs stimulation every now and then, and the best kind of "dope" is the confidence, praise and support of the chief executives.

The Resale Market

A very important, in fact imperative, feature of customer ownership is the re-sale or secondary market. It must be possible for a purchaser to liquidate his holdings promptly and at a satisfactory price. This does not mean that a company should agree to repurchase stock on demand, or tie itself to any other dangerous and unbusinesslike practice. It does mean, however, that a market should be made for stockholders who have to, or who may wish to sell. Our method is to offer at the beginning to dispose of such re-sale stock at a price $2 less than the price at which the stock is being

(Continued on page 1236)



Who Operates *Your* Gas Plant?

WHATEVER fuel you use, or however you use it — you are operating a gas-making plant. The flame is the result of the combustion of the gaseous products which you have released from the fuel.

An article published in the *Scientific American* of December 1923, says, 'When any combustible burns, it is first transformed into gas and then the gaseous products are burned. . . . . Any apparatus that burns coal or coke is primarily a gas producer. The efficiency of such a producer must necessarily be far below that of the apparatus used in the modern gas plant. In other words, from the standpoint of fuel economy, it is far more logical and economical to make the gas first under perfectly controlled conditions and technical supervision, then burn the gas as fuel — than to burn fuel from which gas is or may be made.'

A Simple Test Proves That When A Combustible Burns It Is First Transformed Into Gas.

A piece of paper is rolled up tightly in the form of a tube. One end is closed by folding over the paper and a small hole is made in the tube near that end. The other end is open to the air and the paper is set fire to at that end. If the paper is held so that the smoke travels up the tube, as the smoke issues forth from the opening at the closed end, it can be lighted and burned. . . . . from the *Scientific American*, December 1923.

It is better to burn gas as fuel — not fuel as gas.

More than 1600 industrial users have found that the Boston Consolidated Gas Company makes *better* gas — more effectually than they can.

Our Industrial Service Experts will be glad to co-operate in solving your fuel problems. It costs nothing to investigate.

GAS for Industrial Heat

Boston Consolidated Gas Company

The Design of Gas Appliances

The essentials of efficient gas equipment

Dr. Karl Bunte

(The following article, which is translated from the German gas journal, Das Gas und Wasserfach, is of particular interest to American gas men in that it contains the ideas of so eminent a gas engineer as Dr. Bunte on the important subject of the use of gas in gas appliances. Dr. Bunte discusses the matter in a broad sense and indicates what the principles are upon which efficient gas appliances should be designed. His ideas are applicable to all conditions, for he bases them primarily on the attainment of efficient combustion and best utilization of the potential heat values that are contained in the gas and in the products of combustion. This is an important matter to all gas men and to the gas industry all over the world. Gas, to be sure, has entered a competitive field in attempting to supply the needs of industry, but in the home as well it must be burnt efficiently and safely in order to give best service. The American gas industry can pride itself on being equipped with gas appliances which are correctly designed and which give the best possible results by utilizing to the best advantage the heat that is produced by burning the gaseous fuel in them. But, in spite of this, it is well to have the opportunity to read the views of an experienced gas man, who, though not being connected with the American industry, may have ideas and suggestions which may have some direct appeal to the American gas man. It is always refreshing to listen to the words of an outsider who may say something that might be suggestive.—Trans.)

Introduction

THE inventions and the discoveries that are brought forth day by day in the field of gas appliances may be considered as a sign of the great interest that exists in the use of gas for domestic purposes, or then, again, it may be taken as a sign of dissatisfaction with gas and with what it has accomplished along these lines. At any rate, it is true that many inventors are concerning themselves with designing new domestic appliances and are attempting to improve the construction of those in common use. Nevertheless, it is not wise to judge these inventions in too off-hand a manner, but it is well to try to direct the work of the inventors towards the right path. It often happens that the inventor strikes a real need, but just as often he does not select the right method to go about in supplying the correct means for filling that need.

The Gas Range

The fundamental difference that exists between the use of gaseous and solid fuels in the kitchen lies in the fact that in the case where solid combustibles are employed the pot must be taken away from the fire, or pushed to one side, or the excess heat must be removed by covering the open fire with a stove lid, while in the case where gas is employed for cooking the source of heat is physically removed, the flame is extinguished or the gas is turned down. In the case of solid fuel, the transference of the heat is regulated, but in the case of the gas range it is the consumption of fuel that is regulated. In the possibility of turning off the gas, and particularly in the possibility of exercising exact control of the gas flame, lie the important economy of the gaseous fuel. This must be taken into consideration in the construction of the gas range as well as in its use, hence in the critical analysis of the efficiency of gas ranges as well.

In the construction of the modern range provision is made not only for cooking the food with the full flame, but also for warming the food after it is cooked, in which case a smaller flame is employed. The consumption of gas varies and means are provided for the positive regulation of the consumption of gas in a suitable manner.

Cooking With a Small Flame

There is, however, one tendency in cooking with a small flame which needs a certain amount of consideration and study, and that is, the flare back of the gaseous flame when the gas is turned down too low. The regulation of the air mixed with the gas for combustion purposes cannot be accomplished by means of a valve, but it is controlled by means of air openings which are closed by a shutter in the head of the burner. The ratio of the amount of gas emerging from a jet to the quantity of air-gas mixture formed, which is finally burnt in the burner, controls the amount of primary air mixed with the gas. If, for any reason, as the stopping-up of the gas pipe or the reduction of pressure in the gas mains, the amount of gas issuing forth is reduced in volume, then more primary air than is necessary will be mixed with the gas and the danger of a flare-back of the gas flame is increased. The flare-back is particularly noticed, more so than under any other conditions, when, by opening the gas cock wide, a further reduction in the pressure in the small gas flame takes place. Likewise, the same

phenomenon takes place when shifting from the small burner to the large burner on the range. Hence this is one point that should be taken into consideration in analyzing the effectiveness of a gas range.

Auxiliary Burners

Too much stress should not be placed, however, on the use of auxiliary burners for keeping food simmering hot or gradually cooking after the first stages in the cooking processes have been carried out by means of the large flame burners on the range. One of the advantages of the present day gas range is that the cooking of the food can be regulated so as to consume the proper length of time while at the same time the attention of the cook can be directed to other matters. In other words, it is not necessary to stand constant watch over the food cooking on the gas stove. For this purpose the gas stove is provided with ovens and chambers in which the food can gradually be brought to a finished, cooked stage, and in such cases it is not necessary to have a special auxiliary small flame burner in addition to the regular full flame burners. Hence, with the exception of a few operations, such as the cooking of potatoes, it is not necessary to use the auxiliary small flame burner.

Regulating the Full Flame Burners

Another important matter in the construction and use of the gas range is the regulation of the full flame burners. There are many operations which are carried out on the gas range wherein it is necessary to be able accurately to control the full flame burner, for the heat developed by it may be too great for a particular purpose, while that of the auxiliary small flame burner may be too small. It must be possible to regulate the full flame burner without any flare-back of the gas flame. In such cases the combustion air or primary air is not controlled by an injector action when the flame is turned down very low. Of much greater importance is the relation between the quantity of gas that flows out of the jet and the total magnitude of the jet opening itself, the cross-sectional area of the same at the burner head.

If the volume of gas and the pressure of gas are reduced, then the quantity or rather volume of air that is sucked into the burner and mixed with the gas is not reduced, as must be the case with the injector, but the total gas mixture, the mixture of air and gas, which can flow through the burner, is considerably increased by the larger volume of primary air that is mixed with the gas. Hence, the result is that too much primary air is mixed with the gas and the first effect is that the speed of the flow of gaseous mixture through the jets is reduced. Hence the speed of emission of gaseous mixture from the jets is less than the velocity of the back-ignition, with the result that the flame strikes back.

(Dr. Bunte goes on at this point to criticise the various appliances which have been brought out on the market in Germany. He claims that they are all worthless as far as counteracting this condition is concerned. He states that in certain cases they are not only valueless, but actually dangerous.—Trans.)

The full-flame burner requires only a slight excess of primary air. It should burn with a roaring noise. Such manipulation of the regulating device on the gas burner is simple and should offer no difficulty whatsoever. Before leaving this subject it must be pointed out again that the regulation of the burners on the gas range is an important criterion in judging the value of the range, just as important as the efficiency of the range itself as a cooking device.

Determination of Range Efficiency

The efficiency of a gas range may be denoted as the relation between the available heat in the gas that is consumed in the range and the actual amount of heat that is put to useful purpose. It is generally determined by heating a volume of water on the range. At all events, the efficiency of the range can only be determined for a double system, the range plus the pot in which the water is heated. As has been found by various investigators who have concerned themselves with this subject, the results are dependent to a large degree on the ratio between the gas consumption and the size of the pot. Hence attempts have been made to standardize the size of the pots used, and it has been established that the shape of pot, which is best suited for its size, should be chosen. Then the average time spent in bringing the water up to a boil, from 20 to 95 degrees C., was found to be from 15 to 17 minutes for a pot filled two-thirds of the volume with water. Then it was found that the surface of bottom of the pot consumed about one liter of gas per hour per square centimeter.

The Temperature Differential

The results obtained at different temperature intervals which are used in the tests are not equal. Thus, the partial efficiency of the gas range in the case of cold water is considerably greater than that with hot water. Conditions thus arise which are peculiar to each temperature range and it is not equitable to make a comparison between the effectiveness of ranges in heating water unless the temperature interval observed in each case is identical. It is important to remember that at a temperature of 95 degrees C. a certain amount of heat will be consumed in vaporizing the water, and this requires a much greater amount of heat than the mere raising of the temperature of the water. Hence, in making tests of the efficiency of the gas range in heating water, the temperature should not be raised to as high a point as 95 degrees C. As far as the absorption of heat by the metal of the pot in which the water is heated is concerned, it is common practice to neglect this in making efficiency determinations. That this practice is a correct one, namely,

(Continued on page 1235)

INDUSTRIAL GAS LESSONS

IF IT'S DONE WITH HEAT — YOU CAN DO IT BETTER WITH GAS

Lesson No. 47

Change of State *(continued)*

The British Thermal Unit

Before proceeding further to a discussion of the subject of specific heat and thermal capacity, it will be well first to consider the matter of measurement of heat and the definition and determination of the units used therein.

In previous lessons it has been indicated that temperature was one way of measuring the heat content of a substance. It was emphasized that the temperature of a substance is not indicative of the absolute heat content of the same, but that it tells something about the body in comparison with its surroundings. Thus if one body has a temperature of 100 degrees F, and the temperature of the air is only 60 degrees F, then there is very likely more heat in that body than in the air, and heat will travel from that body to the air heating up the latter to a certain extent. It does not, however, follow that just because the temperature of a substance is greater than that of another that its heat content is likewise greater. Thus, a ton of water at 100 degrees F will contain much more heat than a ton of iron at the same temperature, although the thermometer readings will be exactly alike.

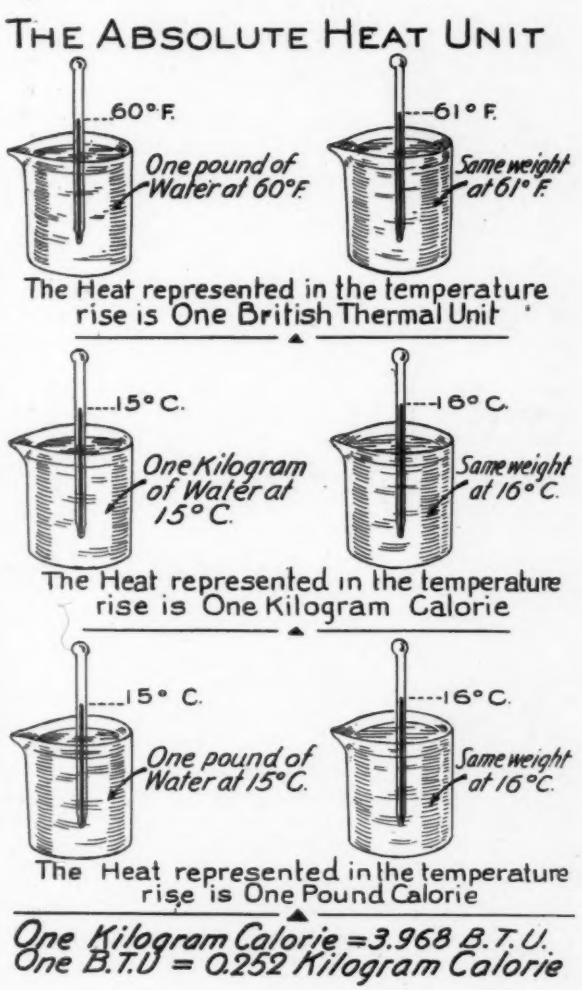
Hence, while temperature tells us something very important about a body, as far as heat mensuration is concerned, it is of no value at all. Recourse must bt had to a more definite, an absolute system of heat measurement, using well-defined units which will tell exactly how much heat is contained in the substance.

The Calorie and the British Thermal Unit

There are two units used in measuring the actual quantity of heat contained in a substance. One of these is the calorie, which is part of the metric system of measurements, commonly employed in Europe (the Continent) and in scientific work, while the other, the British Thermal Unit, abbreviated as B.t.u., is employed in the English-speaking countries throughout the world.

In both cases the substance on which the heat unit is based is water, pure water, water that contains nothing in solution or in suspension. There are two units termed calorie. One is known as the large calorie or kilogram calorie, and the other as the small calorie, or gram calorie. The gram calorie is that quantity of heat that is required to raise one gram of water one degree Centigrade from 15 to 16 degrees C. The kilogram calorie, which is written sometimes with a Capital C, thus Calorie—is the heat that is required to raise one kilogram or one thousand grams of pure water, one degree Centigrade, from 15 to 16 degrees C.

On the other hand, the British Thermal Unit is defined as the amount of heat that is required to raise one pound of water one degree Fahrenheit from 60 to 61 degrees F., or, as some authors state it, from 39 to 40 degrees F.


THE ABSOLUTE HEAT UNIT
60° F.
One pound of Water at 60° F.
61° F.
Same weight at 61° F.
The Heat represented in the temperature rise is One British Thermal Unit
15° C.
One Kilogram of Water at 15° C.
16° C.
Same weight at 16° C.
The Heat represented in the temperature rise is One Kilogram Calorie
15° C.
One pound of Water at 15° C.
16° C.
Same weight at 16° C.
The Heat represented in the temperature rise is One Pound Calorie
One Kilogram Calorie = 3.968 B.T.U.
One B.T.U = 0.252 Kilogram Calorie

Variation in the Heat Magnitude

There is certain difference between the amounts of heat that are required to effect the last-named temperature changes, but it is very small and need not be considered at all in practical work. It is, however, true that it does require less heat to effect the rise of one degree of temperature at the lower ranges than at the higher ranges, in other words, for example, from 40 to 41 degrees F. than from 200 to 201 degrees F. But the difference is so slight that for all intents and purposes it is perfectly satisfactory to assume the British Thermal Unit to be one one hundred and eightieth of the amount of heat that is required to raise the temperature of one pound of water from 32 to 212 degrees F. Likewise, the large calorie may be assumed to be the one one hundredth part of the quantity of heat necessary to accomplish a temperature rise of 100 degrees C., from zero to 100 degrees C., from zero to 100 degrees C. in a kilogram of water.

Relation Between the Units

While results in practical work are usually expressed in British Thermal Units, it often happens that scientific data is given in calories, either large or small. It is, therefore, necessary to convert calories into British Thermal Units, and vice versa.

The relation between the two units may be expressed as follows:

One large calorie is equal to 3.968 B.t.u., and

One B.t.u. is equal to 0.252 calorie (large).

Another unit is also employed by certain writers and investigators and that is known as the pound calorie. It is the number of calories that are required to raise one pound of water one degree centigrade. The relation between the B.t.u. and the pound calorie is simply that between the degree Centigrade and the degree Fahrenheit, for the B.t.u. is the amount of heat required to raise one pound of water one degree Fahrenheit.

Hence the pound calorie is equal to nine-fifths of the B.t.u., thus:

$$\text{Pound calorie} = \frac{9}{5} \text{ B.t.u., or } 1.8 \text{ B.t.u.}$$

Then, again, inasmuch as the B.t.u. is equal to 0.252 large calorie, the pound calorie is equal to 1.8×0.252, or 0.4536 calories (large).

Resume of the Heat Units

The relations between all the heat units may be summarized in the following tabulation:

	B.t.u.	Large Calorie	Small Calorie	Pound Calorie
British Thermal Unit	1	0.252	252	0.555
Large Calorie.....	3.968	1	1000	2.2
Small Calorie.....	0.003968	0.001	1	0.0022
Pound Calorie.....	1.8	0.4536	453.6	1

This tabulation gives all the units that are commonly used in heat work and their equivalents.

Solving the Industrial Gas Problem of the Small Gas Company

A plan for combining individual efforts

E. G. deCoriolis

ADDRESSING, as I do, a gathering of industrial engineers, some of the remarks I am about to make will appear rather trite, a repetition of many facts which are familiar to you. However, as we are seeking a solution to a problem which confronts us, it is logical to set forth this problem in all its aspects in order that we may arrive at an intelligent solution.

I believe it is a generally accepted fact in the gas industry today that one of the greatest, if not the greatest, field for potential business in the further development of the industry lies in increasing the sale of gas for industrial purposes. Figures have been compiled showing that in the last decade the sale of gas for industrial purposes has increased sixteen-fold, whereas the total sales of gas for all uses have only increased three-fold. I am excluding from my remarks the subject of space heating or house heating, which is a problem in itself, and does not fall under the caption of industrial operation.

Factors Responsible for Increase in Industrial Gas Business

It might be well to briefly review the factors which have brought about such a large increase in the sale of gas for industrial purposes within the last decade. There is no question but that the war had a great deal to do with this development. At a time when manufacturers were pressed by the urgency of doubled and trebled production in their shops, and when the cost of manufactured product became, in many cases, a secondary consideration,

(Continued on page 1232)

As The Journal Views It

THE QUALITY OF GAS

Within the past few months one of our most prominent contemporaries in the chemical field took occasion to find fault with certain expressions of gas men regarding the quality of gas and its relation to the B.t.u. content. We shall not attempt to enter any controversy in this connection, but solely intend to point out to the gas industry that there is quite a good deal of confusion and haziness regarding what is meant by quality of gas and what relationship exists between this and the number of heat units found in the gas.

In other words, it is not altogether clear to all that there is quite a difference between the quality of gas and its potential heating value. The criticism that was directed against the gas industry is due in part to a misunderstanding on the part of the critic, and also perhaps to a little uncertainty on the part of the gas men themselves who subscribed to the criticised statements.

What is, then, the quality of the gas, and what is its importance to the gas men and to the gas industry? What difference does there exist between quality of the gas and concentration of heat units per cubic foot?

There are quite a few different sorts of gases used throughout the country. Some of these gases have a high B.t.u. thermal value, and some have a low. In fact, the gases vary from 1,000 to 1,100 B.t.u., in case of natural gas, and as low as 80 or 100 B.t.u., in case of some blast furnace gases. There is no question but that the 1,000 B.t.u. natural gas contains more heat per cubic foot than the 300 B.t.u. blue water gas. No gas man attempts to contradict this fact, and it is not the intention of the gas industry to say to the public that the 300 B.t.u. water gas contains more heat than the 1,000 B.t.u. natural gas or the 500 or 600 B.t.u. coal gas. This has never been in the mind of the gas industry, and in this respect it has been greatly misunderstood by our worthy critics.

But the mere fact that a gas contains a great concentration of heat units does not make it the best gas for any particular purpose. There are other factors to be considered besides the B.t.u. per cubic foot in the manufactured gas. It may well be that these other factors can result in the obtaining of better efficiency with a lower B.t.u. gas than with a higher B.t.u. gas, and this is exactly what is the case with a 300 B.t.u. natural gas, or 500 or 600 B.t.u. coal gas. It is, of course, to be understood that such results are only to be obtained when the appliance has been properly designed for the purpose.

Tests conducted by gas companies and by disinterested Institutes and Bureaus connected with the Government have shown this to be true, and the reason that it is true is that in determining the effective heating value of the gas, not only must the quantity of thermal units per cubic foot be taken into consideration, but also the quality of the gas.

The quality of the gas depends upon how it burns, and what temperature it produces when burning. It must be remembered that every gas, no matter what its B.t.u. value, must be mixed with air in sufficient proportion to give perfect combustion, and that the gas that has the most B.t.u. per cubic foot will naturally have to have the most air for combustion. Concentration of the B.t.u. in the mixture of air plus gas is almost the same for the blue water gas as it is for the coal gas or a natural gas, the difference being too small to be of any real account. But this in itself is not so important a matter as the concentration of heat units in the products of combustion. This is what counts for the heating is accomplished, not by the original gas, but by the combustion products that are obtained from it and the heat that is contained in them.

This factor, in combination with the flame temperature and the rate of flame propagation are what determine the efficiency of the gas. The higher the flame temperature the greater will be the transferance of heat from the hot and the cold body. That stands to reason, for all laws of heat transmission are based on the difference of temperature, and the greater this differential the greater amount of heat that is transmitted.

In the case of high B.t.u. coal gas and natural

gas the hydrocarbons that are responsible for the high thermal value possess the bad property of burning very slowly. In other words, the rate of combustion is very slow in comparison with hydrogen or carbon monoxide, as in the case of blue water gas. There is no question but that the rate of combustion of blue water gas is considerably greater than that of natural gas, or coal gas which contains considerable methane and other higher hydrocarbons. A blue water gas burns much more rapidly than a natural gas or coal gas and because it burns more rapidly the heat developed in combustion is produced within a shorter space of time, and the natural result is that the products of combustion are heated up to a higher temperature. This is the reason why it is possible that better results will be obtained by the use of 300 B.t.u. coal gas or natural gas when the appliance is designed properly. The flame is firmer and more concentrated, due to the high rate of flame propagation; consequently, there is less chance for loss and dissipation of heat by radiation than in the case of the slower burning gases.

This is the statement that the gas industry wants to make to the public. It does not intend to say in any way that there is more heat in the blue water gas than there is in the higher B.t.u. gases, but that it is possible, by the employment of properly constructed equipment, to use more efficiently the heat that is contained in blue water gas than what is contained in certain other gases that have a higher thermal value.

GAS WRINKLES

*A Seal for Liquid Purifiers or Scrubbers

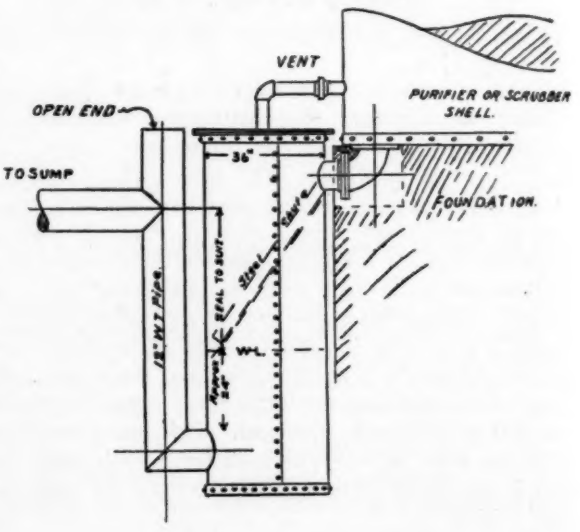
Where the nature or velocity of the fluid used in liquid purifiers is such that gas bubbles are entrained in the fluid, it has been found that the ordinary dip pipe hydraulic seal is not satisfactory, as the gas bubbles are carried through the dip pipe and rise through the liquid in the seal pot, escaping at the top. This constitutes a fire hazard as well as an extensive loss of gas.

The seal illustrated consists of a gas-tight steel seal pot with inlet from purifier or scrubber entering above the fluid level and the overflow outlet at the bottom. A steel chute is installed which extends from the inlet opening to the fluid level when pressure is on the seal, and a vent pipe leads from the top of the seal to the purifier or scrubber shell.

With this arrangement the fluid enters the seal through the inlet and runs down the chute to the level of the fluid in the seal pot; this decreases the impact and causes a minimum amount of turbulence in the liquid, the gas bubbles are released on top of the liquid and escape through the vent back to the purifier or scrubber shell.

Seals of this type have been installed and are giving satisfactory results at various plants on the system of the Pacific Gas and Electric Company.

SEAL FOR LIQUID PURIFIER OR SCRUBBER



*A Gas Wrinkle contributed by the Pacific Gas & Electric Co., and reported at the annual meeting of the Pacific Coast Gas and Electric Association.

Catechism of Central Station Gas Engineering in the United States

Installment No. 47.

(Continued from last week)

The system described for the set card applies equally to the remove and to the change card, the latter being a combination of the set and remove.

The full entry on the history card having been made, the card is returned to the Commercial Department. Here the index is entered in the ledgers and the card transmitted to the Meter Repair Shop, where the description is entered on the meter record card described in answer to question No. 247. By keeping the numbers of all meter order cards consecutive, the meter repair shop, by filing the cards numerically, can determine if there are any omissions, and thus any permanent loss of an order card will be known.

DISTRICT	WHY CHANGED?	METER ORDER No.	CHANGE
THIRD	WATER	21202	THIRD DISTRICT MAR. 24 1903

LOCATION 1260 W. Market

NAME Chas. Smith

Ledger Name ____ Comp. Ledger 3/24 Folio 21 By J. D.

	METER SET.	METER REMOVED.	WHERE	REM.	SET.
Co's No.	103362	26781	Ledger No.		
Size	5	5	Page		
Index	0	342	Folio		
Chg'd by	S. Robinson	Shop	Line		
Date	3-26-03		Route No.		
			L. P. Fol.		

The duplicate held in the Commercial Department as a check is destroyed upon the return of the original from the Distribution Department.

It will be noted that Forms 1, 2 and 3 are printed on both sides, the back of the card being used by the fitter to make reports when he is unable to complete the work, or to add any additional information. This will be clear by referring to the reverse side of the change card, these cards being filled out complete, and also entered on the history card. An examination and comparison will render the scheme clear.

The question as to the correct reading of a meter when set or removed often arises after the reading has been changed, either through use or repair of the meter. It is quite important in such cases, involving, as they do, a difference of opinion between the consumer and the company, that the latter has in its possession sufficient evidence to assure the correctness of the reading on its own books. For convenience, the evidence in each case will be shown below, though some of it will be a repetition of what has been written before.

Checking Correctness of Reading

To check the correctness of the reading on a set card, we have,

1. The reading shown on the shipping slip from the meter repair shop, or, if the meter has been proved in the districts, the entry of the index in the proving record book.
2. The entry in the set and remove book.
3. The entry on the history card.
4. If the meter had been previously in use at another location, and removed and proved without altering its index, the removal card could be referred to. The necessity of this would scarcely ever arise.

To check a remove card, we have,

1. The entry of the index in the meter-proving book.

DISTRICT	WHY CHANGED?	METER ORDER No.	CHANGE
THIRD	WATER	21202	THIRD DISTRICT MAR. 24 1903

LOCATION 1260 W. Market

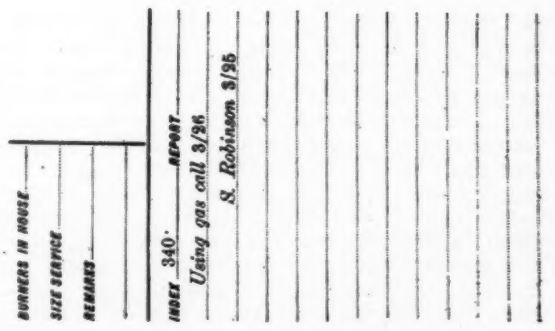
NAME Chas. Smith

Company's No. Meter Removed 26781

Authority for Order ____

DUPLICATE

Original and Duplicate will receive the same "Meter Order Number." Dispatcher will send Original to Shop. This Duplicate will be placed in geographical file of "Duplicate Orders Unattended To"; from which it will be removed when Original Order has been returned from Shop and entered in Meter Location Book. This Duplicate will then be placed in serial file, and, after accounting to the Superintendent of Meters for orders issued, to be destroyed.



2. The entry in the set and remove book.
3. The entry on the history card.
4. The entry on the shipping slip if the meter is sent away for repairs after removal, or the record of the set, if it did not need repairing and has been again set before the question of error arises.

The change card being a combination of the set and remove, the above applies equally well to it.

Form 4. **CONSUMER'S RECORD CARD.**

1260 *W. Market* ST. *1st Floor*

Meter		Set			Removed			Service	
Co's No.	Size	Order No.	Date	Index	Order No.	Date	Index	Size	Date
26781	5	6871	1/22/03	264	21202	3/26	342		
103362	5	21202	3/25	0	62398	9/28	359		

House Pipe Inspection

No.	Date
1	
2	
3	

No. of Burners

Stove Line

Size	Length	Date

Order No.	Kind of Order	Date Rec'd.	History	O.K.
6871	*St.*	1903 1/16	*New Set* ↑ *Set 5 lt. meter, first*	
			floor only. J. Brown 1/23	*O. K.*
27851	*C*	3/24	*Insufficient* ↑ *Found water in 5 lt.*	
			meter, emptied same. Meter should	
			be changed. Ind. 328	
			F. Jenks 3/24	*O. K.*
21202	*Ch*	3/24	*Change water* ↑ *Using gas. Call 3/26*	
			Ind. 340. S. Robinson 3/25. Changed	
			5 lt. meter. S. Robinson 3/26	*O. K.*
62398	*R*	9/26	*Rem. Consumer moved* ↑ *Removed*	
			5 lt. meter. J. Brown 9/28	*O. K.*

Determining Proper Size of Piping

249. What are the rules by which to determine the proper size of house piping to be used when the number of lights to be supplied and the length of pipe along which they are to be placed are known?

Ans. There are several sets of rules in use by gas companies for the determination of the proper sizes of house piping, when the number of lights to be supplied and the length of run are known. The majority of these are copied from the English rules, which are apparently based upon a specific gravity for the gas of 0.420, and a loss of pressure of 1-10 in. in 30 ft. of piping, and the sizes of pipe determined by them are too small when carburetted water gas, or a mixture of this gas and coal gas, is supplied. In 1897 the American Gas Light Association instructed its Research Committee to prepare a table for house piping based upon a loss of pressure of 1-10 in. for each 50 ft. of pipe, with gas of a specific gravity of 0.680. This table was reported by the committee and adopted by the association in 1898, and is given below:

Diameter Inches	Length Feet	Gas per Hour Cubic Feet
3/8	20	11
1/2	30	22
3/4	50	60
1	70	127
1 1/4	100	222
1 1/2	150	349
2	200	718
2 1/2	300	1253
3	450	1977
4	600	4059

No greater length of pipe should be used than is given in the table, e. g., the maximum length of 1 inch pipe allowable under any circumstances is 70 feet, and it should not be expected to carry over 127 cubic feet of gas per hour.

In using this table it is necessary to determine from the number and character of the lights to be supplied the amount of gas which each portion of the house piping system will be required to carry, and, in addition, to obtain from the plans the lengths of these portions. Knowing the quantity of gas and the length of pipe through which it is to be supplied, the table indicates the size of pipe which will pass the required quantity of gas with a loss

CONSUMER'S RECORD CARD.

ST.

Order No.	Kind of Order	Date Rec'd	History	O.K.

of pressure equal to or less than 1-10 in. in fifty feet. The figure for the loss of pressure was adopted after a long discussion as the one which best met all the requirements. The discussion can be found in Vol. XIV. of the Proceedings of the American Gas Association, pages 122 to 130, immediately following the report of the Research Committee in 1897. An article on the subject, in which a table slightly different from the above is proposed, will be found in the American Gas Light Journal, Vol. LXXVIII, page 162. The article should be read by the students.

Inspecting House Piping

250. How often, when, and in what manner would you inspect house piping to insure tightness? Give your reasons.

Ans. When the piping has been completed and before it is covered up by plastering and flooring, for the purpose of seeing that it is of the proper size, and so that if any leaks exist they may be discovered while it is comparatively easy to repair them. After the plastering and flooring have been put in, for the purpose of detecting any damage to the pipes that may have been caused by this work. When any additions or alterations have been made, to see whether the new work is tight.

Directions on Alterations

The Sanitary Engineer and Building Record gives the following clear directions:

"If the house is in progress of construction, see that the outlets are all carefully closed with caps, and that the foot of the rising line is stopped. Then at any convenient side light attach the ordinary gas-fitters' pump, which is simply an air pump. To the same side light, or an adjacent one, attach the mercury column gauge used by gas-fitters with a column from fifteen to twenty inches in length. Great care must now be taken to prove that there are no leaks in the gauge or its connection or cock, and in the pump and hose connections, and a good cock should be used between the permanent gas pipe and any temporary connections to pump, so that it may be closed immediately after the pumping stops, to prevent back leakage of air through the pump valves or hose joints.

"When all is complete, pump the pipe system in the house full of air until the mercury rises at least twelve inches. Then close the intermediate cock before mentioned, and should the mercury column be found to 'stand' for five minutes, it is reasonable to assume that the pipes are sufficiently air and gas tight for any pressure they can afterwards be subjected to.

"Should there prove to be a very large leak, it will be apparent at once, as it will be impossible to get a pressure worth considering, the mercury simply bobbing up and down in the tube.

"It may be an outlet that has been neglected to be closed, or it may be a long split in the pipe. If the former, and very close to the pump, the mercury will not respond; but should it be far away with considerable length of pipe to cause resistance, the mercury will jump and return as suddenly. But should there be a split pipe or an aggregation of small leaks, the mercury will run back steadily, though slower than it rises, between the strokes of the pump. Should it rise well in the glass and sink at the rate of about one inch in five seconds, small leaks only in fittings or joints may then be anticipated. Of course, there are exceptions to these rules, which are only for general guidance.

"To locate a leak, that cannot be heard blowing, strong soap water applied with a brush or sponge may be used. The liquid is rubbed over suspected joints or fittings, and air bubbles are blown by the escaping air.

"Sometimes it becomes necessary to use ether in the pipes in locating leaks, if the pipes are under floors or in partitions. The ether is put into a bend of the hose or into a cup attached to the pipe and blown into the pipes with the air. By following the lines of the pipes the approximate position of a leak may be determined by the odor of escaping ether.

"In very large work it is well to prove a floor at a time, and when all are done, connect them with the riser and prove as a whole.

"If the house is an old one, or has been finished, and you have to test for leaks, take off the meter and cap the bottom of the riser; also unhang the gas fixtures and remove the brackets and cap all outlets carefully. Then use ether and locate leaks before tearing up floors or breaking plaster.

"Occasionally, when a gas fitter cannot get a job tight, there is a possibility he may cut off the part or floor of the building he cannot get sufficiently tight to suit the inspector's idea of perfection. The inspector can only prove such practice by removing or slacking off a cap here or there about the house, if he suspect such an attempt. If no air escapes, then he has the dead end."

Whenever a meter is set the piping should be tested by closing all outlets on the piping, and turning gas into the meter. A movement of the test hand indicates a leak.

Theory of Luminosity

251. What is the commonly accepted theory as to the cause of the luminosity of the flame produced by burning illuminating gas in a luminous burner?

Ans. The principal cause of the luminosity of the flames produced by burning illuminating gas in ordinary burners is believed to be the heating to incandescence, before they meet with sufficient air for their combustion, of minute particles of solid carbon formed within the flames. It is thought that these carbon particles are produced by the decomposition of the hydrocarbons in the gas which results from their exposure, while in the interior of the flame and out of contact with air, to the heat produced by the combustion, on the surface of the

flame, of the hydrogen, marsh gas and carbon monoxide. As the carbon is set free from chemical combination with another element, or, as it is called, is "nascent" in the flame, the particles are really molecules of carbon many times finer than any particles that can be produced by mechanical sub-division, and therefore are readily heated to incandescence by the heat of the flame and as readily consumed when they come in contact with air.

Relation Between Carbon Content and Light

Under this theory the amount of light given by a flame will depend largely upon the quantity of carbon set free in the flame and upon the temperature to which the particles of carbon are heated before they are consumed. In practice it is found that the greatest illuminating value per cubic foot of gas is given by flames when they are just on the point of smoking, and also that anything which tends to raise the temperature of the flame increase the light given, other things being equal.

It will be noticed that the presence of carbon particles is spoken of as the principal, but not the sole, cause of luminosity in the flames produced by the combustion of illuminating gas. This is because a portion of the light yielded by such flames is derived from the combustion, at the high temperatures existing in them, of marsh gas and of some of the heavier hydrocarbons before they are decomposed. An increase in the temperature of a flame increases the amount of light produced in this way as well as that derived from the incandescence of the carbon particles.

Quite a full discussion of the facts and reasoning upon which the solid particle theory of the luminosity of illuminating gas flames is based will be found in the first of a series of lectures upon Gaseous Illuminants delivered by Prof. V. B. Lewes, and published in the American Gas Light Journal, Vol. LIII, page 877, and in the Journal of Gas Lighting, etc., Vol. LVI, page 1140.

Conditions for Maximum Luminosity

252. Under what conditions must gas be burnt in luminous flame burners to secure the greatest possible yield of light?

Ans. Since the light given by a gas flame is due principally to the raising to incandescence of particles of carbon set free by reactions occurring in the flame, to obtain the maximum amount of light it is necessary that the gas should be so consumed as to secure the setting free in the flame of the greatest possible number of carbon particles, and the raising of these particles to the highest possible temperature before they come into contact with oxygen, and burn. These two conditions can only be secured by the proper regulation of the amount of air supplied to the gas producing the flame, and of the manner in which this air is brought into contact with the gas. The formation of the carbon particles being due to the decomposition of the hydrocarbon constituents of the gas, principally by the effect of heat, anything which tends to cause the combustion of these hydrocarbons before they are sufficiently heated to be decomposed, reduces the amount of light given by the flame by reducing the number of carbon particles present in it. And since the amount of light produced by any given number of carbon particles increases with the temperature to which they are raised, anything that tends to lower the temperature of the flame also reduces the amount of light given by it.

Any admixture or intermingling of air and gas previous to the ignition of the gas reduces the illuminating power, both by partially consuming the hydrocarbons before they are sufficiently heated to be decomposed and so reducing the number of carbon particles in the flame, and also by cooling the flame. Any draft by which an excess of air is brought into contact with the flame so as to be heated by it reduces the illuminating power by cooling the flame. To secure the maximum amount of light from the gas, it is, therefore, necessary that the air should be brought into contact with the gas in just the proper amount required for its complete combustion, and in such a way that the contact takes place only on the surface of the flame. With flat flames the great cause of intermingling of air and gas and of excess rush of air against the surface of the flame is a high velocity of exit of the gas from the burner tip into the atmosphere. This velocity of exit increases rapidly with the pressure at which the gas is supplied to the burner tip. It is therefore essential that the pressure at the tip be low. With an Argand burner this pressure can be reduced to practically nothing, but with flat flame burners a certain amount of pressure is necessary to develop the flame to its proper shape, this being especially the case with union jet (fishtail) burners.

Effect of Swirling Motion of Gas

Any swirling motion in the gas also tends to produce an intermingling of gas and air as well as a disagreeable noise, and therefore the arrangement of the burner should be such as to supply the gas to the points of ignition in an even flow, free from eddies or any rotary motion.

To insure that all the gas shall be consumed to the best advantage, it is necessary that the proper proportion between the gas and air supply shall exist over the whole surface of the flame, and, therefore, that the gas shall be supplied in equal quantity at all points of ignition.

The principles governing the efficient combustion of gas for the direct production of light are very fully set forth in part IX, Chapter V (volume III, page 115 and seq.) of King's Treatise on Coal Gas, from which the above summary has been taken.

(Forty-eighth Installment Next Week)

Catalysts in Carbonization

AT a meeting of the Chemical Society in London, England, a paper on "The Influence of Catalysts on Carbonization" was read by Dr. R. Lessing and Mr. M. A. L. Banks. Work on this subject was done by Dr. Lessing in 1914, but had to be abandoned on account of the war, but the investigations have since been resumed with the object of ascertaining the effect of individual compounds on the carbonization of coal. Recent investigations by Dr. Lessing showed considerable differences in the composition of the mineral constituents of the four main ingredients of bituminous coal, differences which have since been found typical for each coal constituent. One of the objects of the present work has been to trace the influence of the typical ash on the behaviour on carbonization of fusain, durain, clarain and vitrain. As the ash in coal cannot be reduced below a certain minimum, sugar and cellulose, practically free from ash, were investigated in the first instance. Forty catalysts were tried, the compounds being added at the rate of 0.01 gram molecule per 100 grams of sugar or cellulose, either in solution or dry, and the coke yield was found to vary between 18.74 per cent and 5.02 per cent in the case of sugar, and between 20.36 per cent and 5.10 per cent in the case of cellulose. These results were obtained on carbonizing the material by the platinum crucible method for the determination of volatile matter in coal (for three minutes only). The authors found that any compound which acted at all did so in the direction of an increase in the coke yield. Whether the action was a truly catalytic one, however, could not be decided on the evidence so far obtained, and definite proof seems difficult since the great majority of the chemical reactions involved in carbonization are irreversible.

Experiments are in hand, but are not yet concluded, to find whether the directional action of the catalysts consists mainly in the formation of intermediate products yielding different percentages of coke during subsequent stages of carbonization, or whether the influence of the catalysts extends to the reactions taking place at these later high temperature stages of carbonization. The remarkable quantitative variation in the yield of coke is equalled if not surpassed by the differences in appearance and structure shown. At the same time, the change which the various compounds undergo during the heating process makes it uncertain whether the original salt, base or acid or their intermediate or final products of decomposition are the actual catalysts.

---

*From The Chemical Age, London.

Experiments with Prepared Coal

A few preliminary experiments were made with coal, although the disadvantage of its inherent ash was realized. Dalton Main (S. Yorks) coking coal was used. After grinding to pass through a 10-mesh sieve, the fusain and some fine dust were removed by elutriation. The remainder, after screening into portions larger and smaller than 30-mesh, were subjected to float and sink tests, and the original ash percentage of 1.11 per cent was reduced to 0.86 per cent, this consisting principally of clay and shale. The impregnation of the coal was done with solutions of the same concentration and in the same proportion as in the case of sugar and cellulose. Carbonization was carried out only by the dry method. There was no difficulty in carbonizing this coal in the electric furnace, and the yields of coke, tar and gas were determined. Similar variations in the results were found as in the case of sugar and cellulose, it being found that the coke yield decreased as the formation of retort carbon increased while the tar roughly increased as the coke decreased, but the percentage variation was considerably greater than that of the coke. It was seen from the results, moreover, that the rate of gas making remained unaffected by the addition of the various catalysts, as did the final yield of gas.

The number of catalysts tried so far was smaller than that used in the sugar and cellulose experiments. They arrange themselves, however, in practically the same order with the untreated coal at the bottom of the list. It was somewhat surprising that the external appearance and size of the coke cylinders obtained did not vary to any extent, but there were indications that their internal structure, and consequently the density, porosity and reactivity differed considerably, as, indeed, was implied by the combination of varying weight and constant volume. Emphasis was laid upon the fact that the coal examined consisted only of clarain and vitrain, and, as had previously been pointed out in another communication on the subject, the formation and susceptibility to "cracking" of the primary liquid products from clarain, vitrain and durain, respectively, indicated a considerable difference in their chemical nature. The results obtained, therefore, the authors observe, must not be applied without discrimination to other coal constituents, and still less to coals of different type or origin. It is suggested, however, that the results are sufficiently definite to indicate that a great deal, if not the bulk, of the research work which has been done on the carbonization of coal and other fuels is subject to considerable revision, as in most of this work the influence of the composition of the mineral matter, apart from the amount, on the course of the carbonization of the coal was entirely neglected.

SOLVING THE INDUSTRIAL PROBLEM OF THE SMALL GAS COMPANY

(Continued from page 1224)

the line of least resistance clearly indicated the use of gas burning appliances due to the ease with which they could be installed and the certainty of a supply of fuel which was unfailing night and day. A great number of such appliances installed at a time of urgency have remained in use and have helped to maintain, and, in many cases, increase the sale of gas in such plants. Following the post-war boom, during which the price of city gas increased, as did that of the majority of commodities, there arose the tendency to substitute other and cheaper fuels for gas in many industries, and had this condition been left to work itself out, there is every possibility that, instead of showing a continuous increase, the sale of gas for industrial purposes would have probably dwindled.

The Advent of the Industrial Engineer

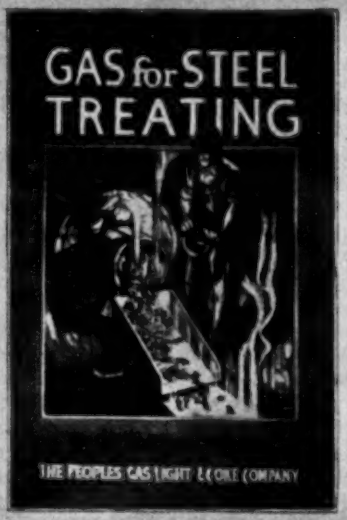
At this stage the industrial engineer came to the fore. Not that he had been inactive during the war and post-war period, but the necessity for his services had not impressed itself upon the minds of executives as a whole. The engineer realized that industry had ceased to speak of gas in terms of utility and convenience and was now considering it mainly on the basis of cost. He was faced with the problem of demonstrating that, broadly speaking, gas was not only the best, but the cheapest fuel of industry. That he has been successful even during a period of depression and sharp competition is amply tested by the continual increase in the sale of gas for industrial purposes.

If this analysis of the situation is correct, and I believe it to be so, credit for this development belongs and must be given to the efforts displayed by industrial engineers throughout the country. In this they have displayed a high degree of salesmanship. Not only have they been successful, but also they have sold to the management of their own gas companies the fundamental idea that in the wholesale use of gas for industrial purposes it was essential that a wholesale rate be applied which would permit gas to win out without the handicap of an excessive and unfair burden.

The Other Competitive Fuels

This brings us to the consideration of the other competitive fuels of industry. Broadly speaking, we are only concerned with fuel oil and electricity.

Telling the World About Industrial Gas



Posters used on the platform boards of the Chicago Rapid Transit—posters that tell the passengers of the speeding trains that Industrial Gas can do a number of things—and do them well.

In certain parts of the country, where coal is cheap, and more particularly in the application of heat to large industrial operation, its competitive value as a fuel must be reckoned with. But for the conditions which I wish to illustrate, we may confine ourselves to the consideration of fuel oil and electricity. I think you will bear me out in my experience that in the minds of industrial executives fuel oil is regarded as not only a highly efficient, but is also the cheapest fuel for most industrial operations. They conceive it as capable of performing every function which one could expect from gas and at a price which is so very much lower that it leaves no choice in the matter. They will concede that for minor functions, such as blow torches or small furnaces, gas is very convenient, but it is altogether too expensive for the larger operations.

At the opposite end in the more refined uses of heat they are turning more and more to the use of electricity, regardless of the cost. To use the words of one industrial executive to whom I had demonstrated by actual test that the application of gas to one of his industrial operations would not only result in a better product, but at a cheaper cost, he admitted the possibility of improving his process, but when he would be ready to make a change he would doubtless go to electricity, as he certainly felt that it was a more up-to-date method. If we were to be deterred by such obstacles, the development of our industry would come to a standstill. But the fact that progress is continually being made and the sale of the industrial gas ever on the increase, is ample proof that if we give due recognition to these obstacles, we certainly do not bow before them. This large gathering of engineers from all parts of the country testifies to the inherent possibilities of gas as an industrial fuel.

But am I right in assuming that the great, the overwhelming majority of this audience, is composed of representatives of the larger gas companies? If I be correct in my assumption, then the natural corollary is that the large gas company does not recognize that there exists an industrial gas problem and has taken no steps to its solution. The small gas company, on the other hand, may or may not recognize that such a problem exists and has taken no steps towards solving it.

Small Gas Company Has Industrial Gas Opportunities

I shall make no attempt to establish a line of demarcation between the small and the large gas company. In what concerns us the number, type and size of industries in the territory served by a gas company is of more importance than the total population within its scope. To serve as an illustration, a large textile center offers few opportunities for increased sale of industrial gas, whereas a metal manufacturing center one-third its size would present an infinite variety of gas problems. The gas company serving the latter territory is the one with which we are mostly concerned. Its engineering staff usually consists solely of a plant engineer who has had no training or experience in pyrometallurgical or other industrial heat operations. He may be, and in most cases is, capable of locating his prospects for the use of industrial gas, but who is going to help him in consummating the sale? This is the gist of our problem.

The Solution of the Sales Problem

What would appear to be a logical answer to this question is that the company should retain the services of a young technical graduate as an industrial engineer. That it is a step in the right direction cannot be gainsaid. But how many such young graduates do you know who would be capable of convincing an industrial executive that it would be to his advantage to scrap many thousand dollars worth of equipment and install gas-fired furnaces at the cost of many more thousands of dollars. Quite evidently, he, too, must look for assistance from some outside source.

Outside Assistance Obtainable

There are many existing agencies to which he may turn and which will assist him in some measure. This association maintains at headquarters a staff of highly competent engineers who are possessed of a fund of information from which he may draw. Through the efforts of committees of this section, valuable data is being compiled dealing with specific applications of gas and which, when published, will greatly facilitate the solution of many industrial problems. Manufacturers of equipment are constantly developing new methods which, coupled with their many years of practical experience and the actual direct help they are prepared to render in consummating a sale, should prove of distinct value. The free and intelligent use of such agencies will, in many cases, achieve the desired result.

Complete Solution Not Afforded

But this is far from bringing about a complete solution. The equipment manufacturer is limited in his efforts to the return which he may secure from the sale of a particular piece of apparatus. In many cases a demonstration is required by the prospective customer before he will consider investing in any new equipment. Experimental work of this kind may be conducted at times in the plant of the equipment manufacturer when it involves standardized furnaces which the manufacturer feels justified to maintain in operation in his plant. In other instances equipment of the type desired may be found in operation in some plant near by, and if the interests of the two customers do not conflict it is possible to arrange for a visit.

This is one of the best ways of selling a new customer. But what is going to be the method of procedure when new apparatus must be designed and experimental work conducted before the prospect can be sold. The large gas company possesses the resources and the executive staff to enable it to go ahead with such development work. The small gas company possesses neither the one nor the other, and yet it may be faced with problems fully as complicated, and which, if they could be solved, would be in proportion of much greater benefit.

Co-operation Between Smaller Gas Companies Advocated

If I have correctly stated the case, it follows then that the large gas company, recognizing its problems, has set out to solve them by devoting a generous share of its resources, as well as securing the service of a competent staff of trained engineers. Considering the smaller gas company, is it not true that their combined potential industrial gas sales may be fully as large and in proportion to their combined financial resources even larger than those

of the more important gas companies. Does it not follow, then, that if these smaller gas companies were to co-operate in their efforts they would place themselves in a position where they would be fully as capable to cope with an industrial problem as the larger gas company?

The actual working out of such co-operative efforts must be left to the management of the gas companies themselves. If this solution to their industrial problem is accepted as inherently sound, there should be no insurmountable difficulty in putting it into actual practice. There is nothing especially new in such an idea. The gas company has a service to render and a commodity to sell. In this respect it is no different from producers of other commodities. The dairy farmers of Ohio pooled their resources and established in the course of a very few years one of the largest selling agencies of dairy products in the world. The Sherman Anti-Trust Law did not apply in their case, nor does it apply to that of gas companies which are engaged in a non-competitive business among themselves. It might be claimed that it is a far cry between selling dairy products and selling gas for industrial purposes. The character of the two products may be vastly different, but the underlying principles of co-operation and selling are exactly the same.

The Idea of an Industrial Association

It might be urged that what is now suggested differs but slightly in form, but not at all in substance, from the co-operative efforts of the gas industry under the aegis of the American Gas Association. I am not proposing a nation-wide co-operative association, as for the purposes desired it would not function. There are in various parts of the country fairly well-divided centers of industrial activity. Speaking of the situation, with which I am more familiar, I can point out to New England where there is an appreciable number of small gas companies, all of which have their industrial problems. The distances that separate them are relatively short and from this standpoint nothing prevents from forming a closely-knit industrial association. Furthermore, the character of industrial operations conducted in this territory are of sufficient similarity that the problems presented in one city are likely to be exactly duplicated by those of another city. A small but competent staff of engineers covering such a compact territory would achieve results at much less cost than if each one of these different gas companies was to retain its own engineer.

What is here suggested does not differ materially from the methods now used by various holding companies. In such aggregations of scattered companies under a single central general management, it is the practice to concentrate all engineering activities under one head, with the necessary assistants, traveling about from company to company.

How many such independent companies should combine their industrial sales efforts and what should be the proper proportion that each should bear in the cost of maintaining an industrial sales force, are matters that necessarily must be left to the companies themselves. Similarly, the initiative for such co-operative efforts must rest with the gas companies. If they clearly recognize the situation that confronts them and see the logic and co-operative effort, one way will have been found towards the solution of their industrial gas problem.

(An address delivered at the meeting of the Industrial Gas Section, A. G. A., Atlantic City convention.)

GEORGE DOES IT AT LAST

And now the gas companies are to have cooking classes for men!

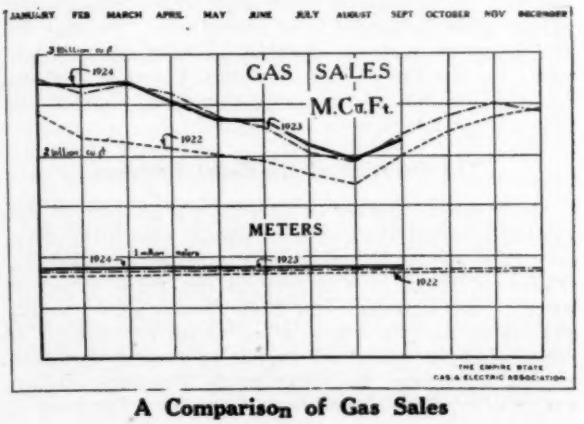
This was the announcement made by the domestic science experts of gas companies at the recent convention of the American Gas Association.

The first evening class for men has been established already by the Laclede Gas Light Company of St. Louis, with Miss Helen Wetherell in charge. Brooklyn, Chicago, New Haven and Denver are expected to organize classes for men before Christmas.

"Our experience in St. Louis," Miss Wetherell said, "is that men want an old-fashioned, freshly-served, home-cooked dinner once in a while, and if their women folk, through lack of knowledge or other causes, are not willing to get it for them, they will do it for themselves.

"Bachelors and male apartment dwellers," according to Miss Wetherell, "constitute the bulk of the men who want to do their own cooking. Occasionally, however, a husband brings his wife to the class or a young man his sweetheart, and it is not unusual for a man who has been living for years on a warmed-over and monotonous diet to call up the home service instructor of the gas company and thank her, almost with tears in his voice, for the change which has taken place in his home.

"Cooking with modern gas appliances is a simple matter," Miss Wetherell said. "There is nothing occult about it. Most of the famous chefs of the world have been men, and there is no reason why men cannot be just as good cooks as their wives."



A Comparison of Gas Sales

THE DESIGN OF GAS APPLIANCES

(Continued from page 1222)

to take into consideration merely the heat contained in the contents of the pot and not in the metal of the pot, was proven by a number of experiments that were made with different weights of aluminum pots wherein it was found that any differences which did exist were counterbalanced by other influences, such as the heat conductivity of the metal, etc.

Differences in results were found according to whether the water kettle was cold or warmed up somewhat before the test; these differences amounted to 4 per cent. Furthermore, the calorific power of the gas, the flame temperature as well as the content of incombustible materials in the gas also had a certain effect on the results, amounting to approximately 3 to 5 per cent.

Distance of Pot from Burner and Formation of Carbon Monoxide

The efficiency of the heating process is dependent to a large degree on the distance separating the bottom of the pot from the burner. Hence, when it is desired to obtain greater efficiency, it is necessary to reduce this distance. On the other hand, when this is done, there arises the danger that the gas will not be completely burned, and in certain individual cases the author has actually observed the formation of carbon monoxide under such conditions.

In making the analysis, the so-called iodine pentoxide method was employed. The method is the same that is used in the regular volumetric analysis of gas. It may be taken as a fact that when the distance which separates the pot from the burner decreases below ten millimeters (2.5 inches) there is danger of the formation of carbon monoxide due to the incomplete combustion of the gas. The formation of carbon monoxide is also dependent to a large degree on the percentage of higher hydrocarbons that is present in the gas. In one case, where the gas possessed high calorific power, brought about by its admixture with a considerable amount of the products formed by the splitting of gas oil, the percentage of carbon monoxide was found to be 0.4 per cent.

Temperature Distribution

One of the principal points on which a gas range can be judged is the distribution of the temperature which is afforded by the burner. Sharp, fine pointed flames from the burner should be avoided. To be sure, in the case of heating water, they afford good efficiency, due to the effective transmission of the heat. But in the case of foods, such as grains, rice, porridge and in the baking of pancakes. the avoidance of overheated parts in the cooking utensil and the regular transference of the heat also play important roles.

A test was made in which a slightly greased black iron pan (aluminum distributes the heat much more readily, due to its high heat conductivity) was coated with a thin layer of a paste made from a cereal. In heating with the flame given by the burner on the gas range, an idea was obtained of the distribution of the heat that would take place when cooking pancakes. Another method is to heat a piece of tin plate which has been coated with zinc. This shows a running together of colors according to the distribution of the heat over the heated surface.

The criticism of newly constructed and supposedly improved appliances for use in the domestic field of gas is at the very least a very difficult matter. The matter is one which involves both the inventor, the manufacturer, and finally the user of the appliance. One of the things which always seem to annoy the inventor is when he is asked about the thermal balance that is obtained in his new device.

Bake Oven and Roasting Ovens

In judging the effectiveness of bake oven and roasting ovens, it is advisable to go into the differences that exist between the use of solid and gaseous fuels in these appliances. In the first place the temperature is regulated in the case of solid fuels by means of baffle plates and other such devices, while in the case of the gas-heated ovens the temperature can be much more readily regulated by controlling the flow of gas and the actual development of heat by its combustion. Then, again, more rapid heating which is afforded when gas is used as a fuel reduces the heat losses. The full flame is used for heating the foods up to the boiling point and the high temperatures, which are needed for the grilling of foods, must be controlled in the baking or roasting process.

From a cooking standpoint the gas roasting oven possesses the technical advantage in the cooking of meats that it is possible to close the pores of the meat in a grilling operation, and in this manner obtain a juicier cooked product. It is unfortunate that most housewives who use roasting ovens do not know this property of the gas range, and still carry on the roasting operation over the open fire.

In the well constructed baking oven baffle plates are employed, but the heat is distributed and the baking is done by means of the heat which surrounds the oven on all sides.

The Gas Iron

In gas irons the gaseous fuel is burnt and gas plates are heated so that effective utilization of the gas is obtained. The iron must be heated internally in order to secure good thermal results. When the flame penetrates into the interior of the iron or when the heating of the iron is accomplished on the open flame, poor thermal results are obtained.

Hot Water Heaters

That gas appliance, which is used in the domestic field and which shows the greatest efficiency as far as thermal conditions are concerned, is the hot water heater. The task of heating water from the room temperature to the boiling point or to lower temperatures is one that can be accomplished with efficiencies of from 85 to 95 per cent in water heaters. One important consideration is the removal of the products of combustion that are formed by the burning of the gas.

Conclusion

This article, which has been translated in much abstracted form, from the original address which was delivered by Dr. Bunte, is interesting in revealing the opinions of one of the most prominent gas engineers in Germany on the important subject of the rational design and construction of gas appliances. It is, of course, desirable that the gas industry has available the best-designed and most efficient gas appliances so that the heat developed in the burning of the gas can be utilized to best advantage. But in order to do this, as Dr. Bunte points out—and in his talk he is, of course, referring only to apparatus which is made in his own country—it is necessary that the manufacturer develop the appliance along technically and scientifically correct lines. In this country we are fortunate in having a group of manufacturers who have done real pioneer work along these lines. The word of caution that is urged upon new inventors who desire to improve gas appliances is also worthy of notice. It is all very well to develop a new appliance, but it is necessary to see that basic thermal principles are adhered to and a real improvement is obtained. In conclusion it must be mentioned that all the statements made in this article are purely author's opinions which may or may not apply to American conditions.

EXPERIENCES WITH CUSTOMER OWNERSHIP

(Continued from page 1220)

offered at the time the holder wants to sell. We have had no difficulty in maintaining a market of this kind, and we know that this ready marketability has contributed in no small measure to the volume of purchasers and sales.

We have communities both large and small where the company's stock is held by a far larger number of people than hold any other single security, with the possible exception of Liberty bonds. Of course this fact is known to sources distributing both good and bad securities. Our stockholders are besieged by salesmen offering to take their shares in trade for all kinds of security issues, automobiles, pianos, real estate, etc. Up to date a surprisingly small number of stockholders have fallen for disadvantageous trades, doubtless because the stock has been well and carefully sold in the first place and because we have always encouraged our shareholders to come first to us if they contemplated letting go of their holdings.

Competition to Be Expected

This kind of pressure from competing sources must be expected, and we feel that our best defense is in keeping the shareholders fully informed as to the earnings, progress and status of their company. With each dividend check we mail a small printed bulletin to transmit such information and we try to protect our stockholders in every possible way by giving them sound advice and accurate information regarding any questions affecting investments.

Our whole experience in customer ownership has taught us the wisdom of directing our efforts to the so-called middle class, including the wage earners. Since we first went into it we have seen a great advance in the relative purchasing power of the skilled manual worker—the $10 to $16 a day artisan. We are today interesting many of this class, in addition to the small storekeeper, the doctors, dentists and other professions. Many retired people of both sexes find the security attracts them because of its safety and frequent dividend payments. Using the partial payment plan as a wedge, we are able to carry a thrift message in our advertising which has a very broad appeal.

I believe you will agree with me that any company undertaking to make shareholders from its service customers should offer them a good security upon its investment merits. It does not pay to base your selling efforts on any other ground than genuine investment value. Working from any other base means an appeal that weakens your position precisely where it is most important that it be strong. To put it another way: urge people to place their money in the company because it is a good investment, not because it needs the money, or cannot give good service otherwise, or because your employees are engaged in a stock selling contest to win a diamond ring.

THE STORY OF GAS

A new booklet entitled "The Story of Gas" has just been issued by the A. G. A. Committee on Education of Gas Company Employees. It is intended to establish, as a background, for further education of the rank and file of workers in the industry, a clear conception of the origin, romance, importance and significance of the gas business.

The booklet is published with the approval and under the auspices of the American Gas Association for the benefit of the industry. This booklet is believed to be intensively interesting, as well as authoritatively informative. It is "a good story."

This booklet is the first of a series to be published by the American Gas Association under the direction of its Committee on Education of Gas Company Employees. The booklets to follow will bear the titles "The Story of Gas Manufacture," "The Story of Gas Distribution," "The Story of Gas Utilization" and "The Story of Gas Service." These booklets are designed to give all interested, particularly gas company employees, a better knowledge of the gas industry.

Current Market Prices

COALS (By Courtesy of Coal Age)
A. Bituminous.

(Spot prices, F. O. B., mines, net tons).

High Volatile, Eastern	Market	Price
Pool 54-64 (Gas Standard)	New York	$1.40 to $1.60
Pittsburgh screened gas	Pittsburgh	2.30 to 2.50
Pittsburgh gas, mine run	Pittsburgh	2.00 to 2.25
Kanawha lump	Columbus	2.35 to 2.75
Kanawha mine run	Columbus	1.40 to 1.75
West Virginia lump	Cincinnati	2.35 to 3.00
W. Virginia gas mine run	Cincinnati	1.40 to 1.50
Midwest		
Indiana 4th vein lump	Chicago	3.00 to 3.25
Indiana 4th vein mine run	Chicago	2.25 to 2.50
South and Southwest		
Big Seam lump	Birmingham	2.75 to 3.50
Big Seam mine run	Birmingham	1.50 to 1.90
Southeast Kentucky lump	Louisville	3.00 to 3.50
Southeast Kentucky mine run	Louisville	1.50 to 1.75

B. Anthracite.

(Spot prices F. O. B. mines, gross tons),

Market	Freight rates	Independent	Company
Egg New York	$2.34	$8.50 to $8.75	$8.75 to $9.25
Egg Philadelphia	2.39	9.45 to 9.75	8.80 to 9.25
Egg Chicago (net tons)	5.06	8.17 to 8.25	8.14 to 8.20

COKE (By Courtesy of Iron Trade Review).

Connellsville, furnace	$3.00 to $3.25
Wise County, furnace	3.75 to 4.00
Alabama, furnace	4.50 to 5.00
Foundry, Newark, N. J., del.	10.41
Foundry, Chicago, ovens	10.75
Foundry, Boston, delivered	11.50
Foundry, St. Louis	11.00
Foundry, Granite City, Ill.	9.00
Foundry, Alabama	4.50 to 5.00

PETROLEUM (By Courtesy of Oil, Paint & Drug Reporter)

(Prices at wells, per bbl.)

Pennsylvania—Ohio—West Virginia.	
Cabell, West Virginia	1.45
Corning, Ohio	1.50
Lima	1.58
Pennsylvania	$2.75 to 2.85
Wooster, Ohio	1.40
Indiana—Illinois.	
Illinois	1.37
Indiana	1.38
Oklahoma—Kansas.	
Mid-continent (low gravity)	.75
Gulf Coast.	
Gulf Coast, Grade A	$1.50
Gulf Coast, Grade B	1.25

GAS OILS.

Gas Oil, Bayonne, bulk gal.	5 to 5¼c
Gas Oil (32-36) Oklahoma, gal.	2¾ to 3 c
Gas Oil (32-36) Gulf Coast, gal	3¾ to 4 c

PIPE AND FITTINGS—CAST IRON GAS PIPE.

(By Courtesy Iron Trade Review.)

Four-inch, Chicago	$59.20 to $60.20
Six-inch and over, Chicago	55.20 to 56.20
Four-inch, Birmingham	51.00 to 52.00
Six-inch and over, Birmingham	47.00 to 48.00
Four-inch, New York	69.60 to 70.60
Six-inch and over, New York	64.60 to 65.60
Standard fittings, Birmingham, base	115.00

6 to 24-inch, base; over 24-inch, plus $20; 4-inch, plus $20; 3-inch, plus $20

BY-PRODUCTS

(By Courtesy of Oil, Paint and Drug

Ammonia aqua, 16 deg. drums lb.	5 to 5¼c
Ammonia aqua, 20 deg. drums lb.	6¼ to 6½c
Ammonia aqua, 26 deg. drums lb.	6½ to 7 c
Ammonia squa, anhydrous cylinder, lb.	30 to 36 c
Ammonium sulphate, bulk F. O B. Works, per 100 lbs.	$2.70 to $2.80
Potash prussiate, yellow casks, lb.	16½ to 16¾c
Potash prussiate, red casks, lb	36 to38 c
Soda prussiate, yellow casks,	9¼ to 9¾c
Soda sulphocyanide, barrels, lb.	45 to 55 c

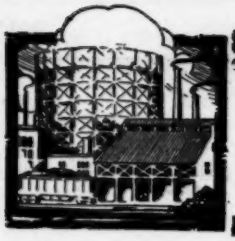
COAL TAR BASIC PRODUCTS.

(By Courtesy of Oil, Paint and Drug Reporter)

Benzol C. P. tanks, works, gal.	24 to 25c
Benzol, drums, gal.	30c
Benzol, 90% tanks, works, gal.	23c
Benzol, 90% drums, gal.	28c
Napthalene, flake, barrels, lb.	5½ to 6 c
Napthalene, dyestuff bags, lb.	5 to 5½c
Solvent Naphtha, water white works, gal.	24 to 25c
Solvent Naphtha, drums, works, gal.	29 to 30c
Toluene, C. P. tanks, works, gal.	31c
Toluene C. P. drums, works, gal.	36c

Crude Oil

Following eight weeks of continuous falling production, the daily average domestic crude oil output showed a gain of 5,500 barrels during the week ended November 15. The American Petroleum Institute estimates that the daily average gross crude oil production in the United States for the week was 1,941,050 barrels, as compared with 1,935,550 barrels for the preceding week. Daily average production east of California was 1,351,550 barrels, as compared with 1,345,300 barrels, an increase of 6,250 barrels.



NEWS OF THE GAS INDUSTRY

Pennsylvania Gas Association to Hold Mid-Year Meeting

The mid-year meeting of the Pennsylvania Gas Association will be held on Thursday, December 4, 1924, at 10 a. m., at the Berkshire Hotel, Reading, Pa.

PROGRAM

10 a. m.—Meeting called to order and opening remarks by the president of the association, John Arthur Frick, Allentown, Pa.

Paper—"Chrisman Down Run Process," L. W. Seltzer, Consumers Gas Co., Reading, Pa.

Discussion

Paper—"Labor Saving Equipment Available for Distribution Work by Gas Companies," A. M. Boyd, United Gas Improvement Contracting Co., Philadelphia, Pa.

Discussion

Paper—"More House Heating," Joseph Lucena, superintendent of gas distribution, The Syracuse Lighting Co., Inc., Syracuse, N. Y.

Discussion

Paper—"Accounting Practice," Howard F. Fry, treasurer, Allentown-Bethlehem Gas Co., Allentown, Pa.

Discussion

Report—"Progress Made with Universities in Reference to Gas Education," W. Griffin Gribbel, chairman educational committee, Philadelphia, Pa.

Note: It is desired to have a full discussion on this subject.

Luncheon

The Consumers Gas Company invites the members and friends of the association to be their guests at luncheon at 12:30 p. m. Music by one of Reading's leading orchestras.

Address—J. Arthur Keppelman, Esq., president, Consumers Gas Co., Reading, Pa.

Address—Paul E. Fickenscher, bureau chief, rates and tariffs, Public Service Commission, Commonwealth of Pennsylvania, Harrisburg, Pa.

Address—"Public Information," Major J. S. S. Richardson, director, Pennsylvania Public Information Committee, Philadelphia, Pa.

Address—F. C. Weber, Public Utility Division, Henry L. Doherty & Co., New York City, N. Y.

Result of Stock Selling

When discussing the purchase of the Poudre Valley Gas Company, of Fort Collins, Colorado, General Manager Clare N. Stannard, of the Public Service Company of Colorado, admitted that one of the first moves would be to look into the feasibility of supplying the city of Fort Collins with natural gas, for that was the franchise, and as the officials of the Poudre Valley accused the Public Service Company of having all kinds of money, Mr. Stannard said:

"We have just finished a customer ownership stock selling campaign, and this raised $1,343,900 through the sale of 13,439 shares of Public Service Company stock at par to customers in Colorado. Incidentally, customers of the Public Service Company in Colorado and Wyoming have purchased a total of 40,254 shares of $100 par value stock in the last twelve months. This makes approximately $4,025,400 that has been invested in Colorado's future in the last year. All that money is being put back in the property to improve it and make it one of the best public utilities anywhere in the country. We believe the vast expenditures which the Public Service Company is making in this state is a manifestation of Henry L. Doherty's great faith in the future of Colorado."

R. A. Wirfs Joins Keystone Refractories Company

Roland A. Wirfs, formerly president of R. A. Wirfs Refractories Company, St. Louis, Mo., has become associated with the Keystone Refractories Company of New York. Mr. Wirfs will be general sales manager in the western district, with temporary office at 4609 McMillian avenue, St. Louis, Mo.

A 50th Anniversary and Some Record

Samuel Gentner, for 46 years continuously employed by the Lovekin Water Heater Company (formerly Deily & Fowler), celebrated his 50th wedding anniversary on November 24, with a large reception at his home in Philadelphia, Pa. "Sam" in the old days traveled the country over erecting gas holders—and is known far and near by the old-timers. He is well over 70 years old now, but still can do a day's work that would put younger men to shame.

Public Service Company Acquires Poudre Valley Gas Company

The Public Service Company of Colorado has purchased the Poudre Valley Gas Company, of Fort Collins, Colorado. While the purchase price was not given, it is conservatively estimated that the property is worth in the neighborhood of $300,000.

At a recent election, the Poudre Valley company was voted a 20-year franchise to supply the city of Fort Collins with artificial gas, but it was stipulated that at any time it was practicable natural gas was to be substituted.

Extend Gas Mains to North Augusta

The Gas Light Company of Augusta has announced the successful termination of their campaign to raise funds for the extension of gas mains into North Augusta. This project assures the citizens of North Augusta of the many conveniences of gas.

The company also advises the future consumers of gas in North Augusta not to buy any second-hand and low-priced gas equipment, as the new and up-to-date gas equipment is more economical to operate than the stoves of a few years ago.

A special demonstration for the citizens of North Augusta will be put on by the company in a few weeks.

The Welsbach Line Makes Friends for Gas Heat

What do your customers look for in a gas heater when they come in to buy?

They are probably sold on gas heat already; they know it is quick, clean and always on the job. But what of the actual heater itself? Is the heat it gives the only consideration? Has economy of operation any influence? Or, does appearance figure most?

No matter what the individual needs and preferences of your customers, they can be met most satisfactorily with the Welsbach line.

The points that help you sell Welsbach Radiant Heaters *keep* them sold, and, what is equally important, keep gas heat sold. The superior design and workmanship result in sturdier wearing qualities and greater and more lasting heating efficiency. The pains taken with the construction, materials and positioning of all component parts of a Welsbach Radiant Heater assure absolutely dependable, complaint-free service. Every user of a Welsbach Radiant Heater becomes a booster for gas heating.

When the testing laboratories of gas companies report to their commercial departments that Welsbach Radiant Heaters, for all-around excellence, are superior to any other on the market, it's an endorsement to be proud of. And they're doing it every day!

No. 37 With Andirons
A new fireplace model, with header extending entirely to the top—an added advantage in practical utility and appearance.

No. 37 With Andirons and Wings
Both No. 37 and No. 39 (identical with No. 37 save for two additional glowers) come with or without andirons, wings and extension top.

No. 29 With Andirons
Has exposed copper reflector.

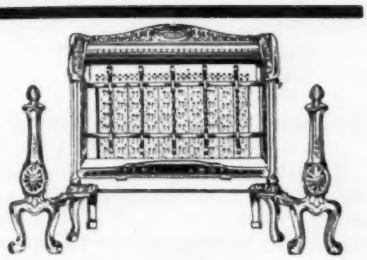
Welsbach Gas Heaters

Their unique method of producing and instantly distributing radiant heat gives to Welsbach Heaters many demonstrable advantages that readily make sales. Perfect service is assured by various exclusive features, each meaning much in added warmth, speed and convenience.

A self-lighter eliminates matches, and, with a header, provides for instant and complete ignition of all glowers. A metal reflector prevents waste and assures instant "pick-up." Perfect combustion is insured by a free flow of secondary air; a screen protecting burner openings from dust and lint; and rust- and corrosion-proof burner caps.

WELSBACH COMPANY GLOUCESTER CITY, N. J.

MEMBER AMERICAN GAS ASSOCIATION



No. 27 With Andirons
Massed glower effect.

Rochester Gas Schedule Approved

Albany, N. Y.—The Public Service Commission has approved changes in schedule of the Rochester Gas and Electric Corporation, filed to become effective December 5, 1924, operating to effect reductions for summer service period (April 15 to October 15, inclusive) in city of Rochester; villages of East Rochester, Fairport and Pittsford; and towns of Chili, Gates, Greece, Irondequoit, Penfield, Perinton and Pittsford, N. Y., available to customers whose consumption during the summer period is 20,000 cu. ft. or over per month. The following-named rates for such service are net (per 1,000 cu. ft.): First 50,000 cu. ft., 60c (reduction 20c); next 50,000 cu. ft., 60c (reduction 10c); next 100,000 cu. ft., 60c (no change); next 300,000 cu. ft. 50c (reduction 5c); excess consumption per month 50c (no change). Minimum monthly charge during summer period reduced from $16 to $12.

E. C. Bryant Joins Arlington Gas Company

The Arlington Gas Light Company announces the addition to their organization of Mr. Everett C. Bryant as superintendent in charge of manufacture and distribution.

Mr. Bryant is a graduate of Worcester Polytechnic Institute in chemical engineering and was formerly assistant superintendent of the Worcester Gas Light Company.

Savannah Gas Co. Elects New Head

Savannah, Ga.—The Savannah Gas Company announces that Walton Clark has resigned as president and that J. A. P. Crisfield has been elected by the board of directors to fill the vacancy. Mr. Crisfield, who has been living in Philadelphia, returned to Savannah and on Monday assumed his new duties.

Southern West Virginia Gas Co. Changes Hands

Huntington, W. Va.—The Columbia Gas and Electric Company, owner of United Fuel Gas Company, has purchased the Huntington Development and Gas Company. The Columbia company took over all of the Huntington firm's preferred and common stock and most of the bonds held by Arthur H. Pierce of Chicago and Houghtelling & Co. of New York.

Consolidation of the United Fuel Gas Company and the Huntington Development and Gas Company, which supply most of the consumers of natural gas in southern West Virginia, was expected.

Coast Counties Gas Company to Make Big Improvements

The Coast Counties Gas and Electric Company have men at the head that have a vision of the Santa Cruz of the future that can set an example which, if followed by others, will put Santa Cruz in the front rank so far as faith in the future of the city is concerned.

Realizing that this is a growing city, they have looked into the future, and, as a result, Santa Cruz will soon be in a position to more than double the gas capacity of the local plant. In fact, plans now being worked out will take care of a city three times the size of Santa Cruz.

A new gas tank with a capacity of 300,000 cubic feet is now nearing completion, at a cost of over $70,000. The new B. & W. boilers represent another outlay of $24,000.

A machinery and boiler room building will soon be built. When completed, the plant will have a capacity of 60,000 feet of gas an hour, or 1,440,000 in 24 hours. The daily consumption at present is around 400,000. There will also be, when fully completed, 12 purifiers to separate the sulphur from the gas.

Altogether about $300,000 is being spent on these improvements, which will not be completed before next April.

The vision of the future, as seen by Mr. Coleman, Mr. Cardiff, Mr. Grimm, Mr. Wehe, Engineer Hall and others, of a growing Santa Cruz, caused his company to build now, rather than wait, and it is this kind of a vision that will make for a bigger and better Santa Cruz.

All of this work has been figured out on a ten year in advance program of the probable needs of Santa Cruz.

W. M. Fowler Recovering from Illness

Mr. Walter M. Fowler, secretary of the Lovekin Water Heater Company of Philadelphia, is slowly recovering from a very serious case of typhoid fever, contracted "on the road."

He was in the hospital, critically ill, for almost three months, but his host of friends will be glad to know he is now home and well on the road to complete recovery.

Ask Increase in Gas Rate

Charleston, W. Va.—An application for an increase in gas rates for Fairmont and the surrounding territory has been filed with the Public Service Commission by the Monongahela West Penn Public Service Company and set for hearing on November 25. The service company is engaged in the management and operation of a natural gas business, with main offices at Fairmont.

The winter rates of the gas company, running from November 1 to March 31, are 39 cents per 1,000 cubic feet. Summer rates, from April 1 until October 31, are 35 cents per 1,000 cubic feet for the first 40,000,000 feet used and 31 cents per 1,000 cubic feet for all over that amount. A 2 per cent discount is allowed by the company for payment within 15 days.

The towns affected by the proposed increase are Fairmont, Barrackville, Monongah, Ida May, Carolina, Farmington and Wyatt.

Lima Men Would Merge Five Ohio Gas Concerns

Application has been made by a number of Lima men to the Utilities Commission for permission to form the Ohio Western Gas Co., Lima, through purchase of the Lima Natural Gas Co., Lima, for $2,374,543; Lima Gas & Light Co., Lima, for $687,956; Wapakoneta Natural Gas Co., Wapakoneta, for $133,089; St. Mary's Gas Co., St. Mary's, for $131,083, and the Celina Gas Co., Celina, for $100,697.

In order to finance the merger authority is asked to issue $1,000,000 par value 6 per cent 30-year mortgage bonds, to be sold at 90; 7,500 shares of 7 per cent preferred stock to be sold at 87½ and 75,000 shares of non-par common stock to be sold at $25 a share.